

Process Improvement in Outpatient Installation RSUD dr. Soediran Mangun Sumarso Using Lean Hospital Approach

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Abstract. RSUD dr. Soediran Mangun Sumarso is a public hospital in Wonogiri district which has an outpatient installation service. However, the waiting time of some services in outpatient installations exceeds the standard time set by the health minister of the Republic of Indonesia. It is known from the data waiting time in the outpatient installation. The purpose of this study is to provide improvements using lean hospital approach. Proposed improvement is done by eliminating waste that occurs in outpatient installation service. The methodology used in this study consists of four stages. The first stage is describing the service system using a cross-functional flowchart. The second stage is identifying waste using value stream mapping, observation and interview. The third stage is to determine critical waste by borda method and pareto diagram. The last stage is to provide recommendation improvement using fishbone diagram and FMEA. The result of this research is proposed improvements. The proposed improvements are adding special register counters, implementing an online reservation system, doctors schedule synchronization, adding doctors in polyclinics, fixing queue numbers, applying visual management concepts, making connecting glass in pharmacies and adding multifunction shelves in polyclinics.

1. Introduction

1.1. Background of the study

Hospitals as one of the health services industry are required to maintain the quality of service. There are several methods that can be used to improve the quality of services, especially in the health sector, one of them is lean. Lean thinking has been introduced in healthcare during the latest decades as a quality-improvement method [9]. Lean aim to improve quality by reducing waste and facilitate flow in care processes [11]. Waste can be defined as something that does not add any value to the final product or is not required [3][16]. The concept of lean thinking has rapidly gained followers and has been adopted widely and successfully in the healthcare arena [7][13][15].

Patient waiting time is one of the potential components causing dissatisfaction[14]. Regulation of the health minister of Republic Indonesia Number: 129 / Menkes / SK / II / 2008 About Minimum Hospital Service Standard (SPM) states that the length of waiting time of the Outpatient Installation is less than 60 minutes. However, the waiting time of some services in outpatient installations exceeds the standard time set by the health minister of the Republic of Indonesia. The Percentage of waiting time over 60 minutes and less than 60 minutes was 55.25% and 44.75%. Based on that background,



this research will identify the waste that causes long service waiting time in outpatient installation RSUD dr. Soediran Mangun Sumarso using Lean Hospital approach. The purpose of this study is to provide improvements using lean hospital approach. The purpose of the improvement is to reduce the waiting time in the outpatient installation.

1.2. Previous research studies

There have been several studies that have discussed lean hospital as an approach to improve the patient services in hospitals. But in previous research there are several different methods that have been used. The research that discusses the elimination of waste in Brawijaya polyclinic with lean hospital approach [8], using pareto diagram to identify the critical waste. While on lean hospital research at Bethesda Yogyakarta hospital [10], using the Borda method to identify the critical waste.

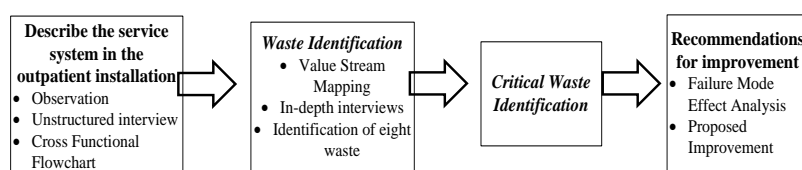
However, in this study only analyzed the 7 waste that occurred. The research using lean hospital approach in Unisma Hospital [2] has analyzed 8 waste that occurred at patient service in hospital. However, the study has not used any method to identify the critical waste. Based on the explanation, then in this study will integrate the tools that have been used in previous research. In this research will analyze the 8 waste that occurred at patient service in outpatient installation and identify the critical waste by using Borda method and Pareto diagram.

2. Methods

The methodology used in this study consists of four stages. The first stage is describing the service system using a cross-functional flowchart. The second stage is identifying waste using value stream mapping, observation, and interview. A value stream map (VSM) is a structured diagram that originated with Toyota, as a tool called material and information flow mapping that used to established a consistent view of the workflow in the same manner the patient experiences it [1][6].

The third stage is to determine critical waste by Borda method and Pareto diagram. The last stage is to provide recommendation improvement using FMEA. The FMEA method is a methodology used to identify and evaluate potential failures, determine the level of risk from failure and priority scale to take the required action [4]. The result of this stage is the recommendation for improvement. Briefly, the methodology used in this research can be seen in table 1.

Table 1. Methodology



3. Result

3.1. Describe the service system in the outpatient installation

To get a complete picture of the service system in the outpatient installation is done by several steps such as observation, unstructured interview with related parties and cross-functional flowchart depiction. At this stage, the cross-functional flowchart is generated. The cross-functional flowchart describes service activities as well as those responsible for service in the outpatient installations. Cross-functional Flowchart can be seen in figure 1.

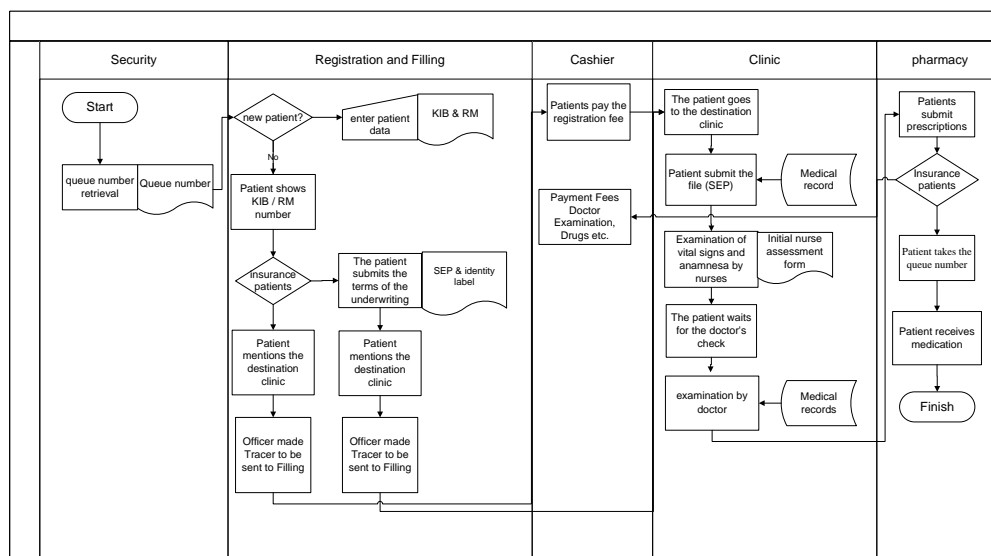


Figure 1. Cross-functional flowchart

3.2. Identification of waste

Value Stream Mapping is used as a tool to identify waste in the service process. Value stream mapping will show the value added and non-value added activity with the total time of each activity. Value Stream is obtained by calculating the processing time and waiting time of each patient service section in the outpatient installation. Furthermore, waiting time and processing time are classified as value added time and non value added time based on activities occurring at outpatient installation services. Based on the data processing time and waiting time obtained, known value added and non value added ratios. Value added ratio is obtained by dividing value added time with lead time. Non-value added ratio is obtained by dividing non-value added time by lead time. Briefly, value stream mapping can be seen in figure 2.

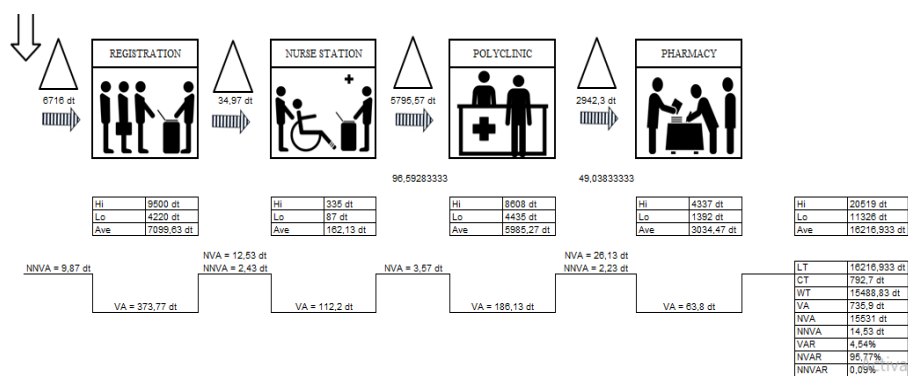


Figure 2. Value stream mapping

Based on Value Stream Mapping can be seen the ratio of value-added, non value-added and necessary non value-added. Value-added ratio is 4.54%, non value-added ratio is 95.77% and the necessary non value-added ratio is 0.09%. Gaspersz (2007) states that if the value added value is still below 30% then the process is "unlean" and still needs improvement.

In addition to using value stream mapping, waste can be identified using in-depth interviews and observations. Based on the results of in-depth interviews and observations of the service process in the outpatient installation, obtained some waste which is the category of 8 waste. The waste of service in the outpatient installation can be seen in Table 2.

Table 2. 8 Waste Activities

No	Waste	Activities
1	Defect	- The patient does not know where the polyclinic is located - Officer wrongly gives medical record - Medical record is missing / has not been returned
2	Over Production	- Overproduction of tracer numbers
3	Human Potential	- There is no customer care that serves the complaints/questions of the consumer directly
4	Waiting	- Patient waiting at registration - Patient waiting at polyclinic - Patients waiting for the drug to be formulated - Patient waiting for Medical record
5	Transportation	- The pharmacist walks back and forth from the drug delivery section to the compounding section to take the medicine - filling officers deliver medical record documents - find medical record documents that are missing or not returned
6	Inventory	- the buildup of medical record documents - certain medicinal stock is empty (unavailable)
7	Motion	- looking for equipment - looking for drugs - Search for Medical Record documents on storage shelves
8	Over Processing	- Inform the same information to the patient repeatedly - checking the vital signs repeatedly - drug inspection repeatedly

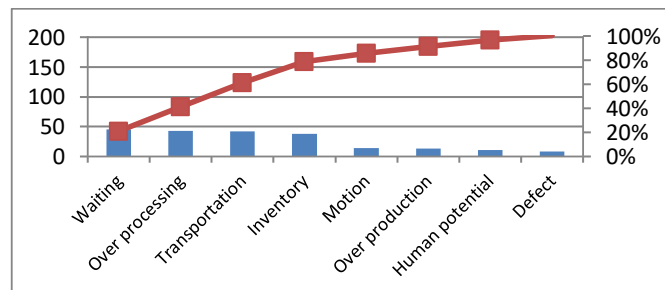
3.3. Critical waste identification

Critical waste identification is done by Borda method. The result of critical waste identification with Borda method can be seen in Table 3.

Table 3. Identification of critical waste using Borda method

No	Waste	Rank								Total	Percentage	Rank
		1	2	3	4	5	6	7	8			
1	Defect	0	0	0	0	0	2	4	2	8	4%	8
2	Over Production	0	0	0	0	1	3	4	0	13	6%	6
3	Waiting	4	2	0	0	1	1	0	0	45	21%	1
4	Human Potential	0	0	1	0	1	0	3	3	11	5%	7
5	Transportation	3	0	2	2	1	0	0	0	42	20%	2
6	Inventory	1	2	1	2	2	0	0	0	38	18%	4
7	Motion	0	0	0	0	3	1	3	1	14	7%	5
8	Over Processing	1	3	2	2	0	0	0	0	43	20%	3
		7	6	5	4	3	2	1	0	214	100%	
	Total											

The waste rank that has been obtained through the Borda method is then identified using Pareto diagram. Pareto diagrams are used to determine the critical waste that becomes a priority improvement on the service in the outpatient installation. The following is a Pareto diagram of the occurrence of waste:

**Figure 3.** Pareto diagram *critical waste*

In accordance with the principle of Pareto 80/20, then the critical waste selected is waste over processing, waste waiting, waste transportation, and waste inventory.

3.4. Recommendation for improvement

Before giving recommendation improvement, firstly weighted failure mode using FMEA. Through FMEA will be known the cause of the problem with the highest risk so that it can be immediately made suggestions for improvement. By multiplying the ranking for the three factors (severity \times occurrence \times detection), a risk priority number (RPN) will be determined for each potential failure mode and effect. Severity is the consequence of the failure should it occur. Occurrence is the probability or frequency of the failure occurring. Detection is the probability of the failure being detected before the impact of the effect is realized. Table 4 shows the FMEA identification with the highest RPN value for each waste.

Table 4. FMEA with the highest RPN value

Waste	Service Section	Failure Mode	Severity	Causes of Failure	Occurrence	Control	Detection	RPN
Waiting	Registration	The queue of patients in the morning	4	The distance of the opening hours of the queue number and the registration counter is too far away	10	Provides 7 registration booths	4	160
	Polyclinic	The doctor came late	2	Doctor visits to hospitalization	8	Not available	10	160
Over Processing	Registration	Notify the same information repeatedly	2	Patients arrived late	9	Not available	10	180
				There is no direction to polyclinic	9	Not available	10	180
	Polyclinic			There is no doctor information	9	Not available	10	180
Transportation	Pharmacy	The pharmacist walks from the drug delivery section to the compounding section	2	There is no part connecting the compounding section and the delivery of the drug	10	Not available	10	200
Inventory	Polyclinic	Build up of medical records	2	There is no special place of the patient's Medical Record document	10	The documents placed on the desk	4	80

After obtaining the failure mode with the highest RPN value in each waste, the next step is to give the proposed improvement in accordance with the failure mode that occurred. Here is a suggested improvement for each waste.

- The proposed improvements to reduce waste waiting are to open a special registration counter for infants and toddlers, elderly aged 60 and above, pregnant and lactating mothers. To reduce the queues that accumulate during peak hours, an online reservation system is applied. Management of RSUD dr. Soediran Mangun Sumarso also needs to synchronize the schedule with the doctor in the clinic so that the accuracy of the service schedule is obtained. The last proposed improvement to reduce waste waiting is by adding a doctor in the polyclinic.
- The proposed improvements to reduce waste overprocessing are to provide information on the estimated time of queue so that the patient can come before the queue number is called. Another improvement recommendation is to add a polyclinic signpost at the outpatient installation and add a doctor's attendance board.
- The proposed improvement to reduce the waste of transportation is to provide a connecting glass that will connect the drug delivery section with the compounding part of the drug so as to minimize the transport carried out by the pharmacist.
- The proposed improvements to reduce waste inventory is to add a multifunctional shelf that can be used as a rack and also a trolley to return medical record documents from polyclinic to filling section.

4. Conclusions

Critical Waste that occurs in outpatient installation services are waste waiting, waste over processing, transportation, inventory. Failure mode with the highest RPN value that occurs in waste waiting is the queue of the patient in the morning and the doctor who arrived late. The failure mode with the highest RPN value in waste over processing is the officer notifying the same information repeatedly. The

failure mode with the highest RPN value in waste transportation is the pharmacist's transportation from the drug delivery section to the compounding section. The failure mode with the highest RPN value in waste inventory is the buildup of medical record documents that occurred in the polyclinic. Proposed improvements that can be made to reduce waste waiting, over-processing, inventory, and transportation are open special registration counters for patients with special circumstances, implement an online reservation system, synchronize the schedule of inpatient visits with the physician and add doctor in the polyclinic, provide information on the estimated time of queue number, add a polyclinic signpost at the outpatient installation, add a doctor's attendance board, provide a connecting glass that will connect the drug delivery section with the compounding part of the drug, add a multifunctional shelf.

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